ARE QUASIMONOENERGETIC ANNIHILATION PHOTONS ENOUGH MONOENERGETIC REALLY?

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Using the method of reduction /1/ reasons of the well-known systematic discrepancies between results of photonuclear experiments using different photon beams were investigated in details for ^{18}O(γ, n) ^{17}O /2/, ^{63}Cu(γ, n) ^{62}Cu /3/, ^{197}Au(γ, xn) /4/ reaction cross sections. For the first time evaluated data were obtained for all three steps of difference procedure (Ye+(Ej) - Ye-(Ej) = Y(Ej) sigma(k)) typical for experiments with quasimonoenergetic photons from annihilation in flight of relativistic positrons (QMA). Clear intermediate structure resonances were found out /5/ (for ^{63}Cu and ^{197}Au as distinct from /3, 4/ results) in cross sections evaluated at the same energy resolution for each experiment step (obtained separately from yields Ye+(Ej) and Ye-(Ej) for reactions induced by positrons and electrons and difference Y(Ej)). GDR structure was compared to that obtained in bremsstrahlung experiments, good agreement was revealed. Inverse operation of evaluated cross sections smoothing gave the real QMA-result energy resolution several times worse (1.3 MeV for /3/ and 1.6 MeV for /4/) than estimated before.

Results obtained mean that typical subtraction procedure of QMA-experiments makes difficult noticeably the estimation of energy resolution really achieved in experiment. That leads to significant missing of the information on reaction cross section structure – as a rule QMA-cross sections are significantly over-smoothed. But information lost can be restored by additional data processing using the method of reduction or analogous ones.

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